

PROFINET IO enabled on Cisco Industrial Ethernet 3000 Switches



PROFINET is one of the multi-bus Ethernet-based standards for the automation industry, allowing integration with IT and Fieldbus systems. PROFINET IO supports real time (RT) automation, and is built on Ethernet and TCP/IP standards. PROFINET IO has two communication channels, a real-time channel and a standard TCP/IP channel. The real-time channel meets the real time needs of factory automation by bypassing the TCP/IP stack for cyclic data exchange between the controller and the IO devices and event-controlled signals such as alarms and diagnostics. The TCP/IP channel is used for network configuration, setting parameters, reading of non-real-time diagnostics, and loading interconnects.

Cisco IE 3000 Series Switches and PROFINET

The implementation of PROFINET IO on the Cisco® Industrial Ethernet 3000 (IE 3000) Series Switches enables integration with factory management tools and provides real-time automation in modular control and distributed systems. With PROFINET IO support, the Cisco IE 3000 series offers a unified solution for configuration, management, and control. The Cisco solution enhances collaboration between IT and control networks by delivering a wire-speed, highly secure switching solution for ease of use in deployment and manageability with SIMATIC automation tools.

The Cisco IE 3000 series is optimized for real-time automation and is well suited product for industrial-rugged environments and industrial Ethernet applications, including factory automation, intelligent transportation systems, process control, and other PROFINET-based applications.

The Cisco IE 3000 series offers:

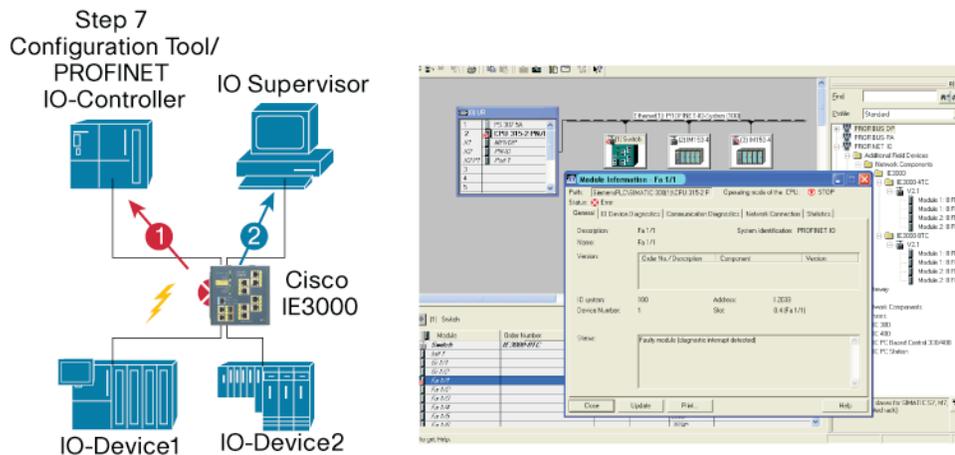
- The Cisco Catalyst® switching architecture and feature set, highly secure integration with corporate networks, and integration with PROFINET-based devices
- PROFINET v2 certification, with PROFINET conformance class B compliance
- Integration with SIMATIC tools (Step 7 or NCM PC) through an installable Generic Station Description file (GSDv2.1)
- Cyclic data exchange between programmable logic controllers, IO devices, and other mMotion controllers
- Ease of deployment with SIMATIC integration, configuration, parameterization, and exchange of alarms and diagnostics with PROFINET controllers
- Support of ProfiSafe applications with wire-speed switching

- Support of management tools including: SIMATIC tools for Factory Automation, Cisco Network Assistant, Cisco Works, and SNMP-based tools for IT integration
- Ease of use: Cisco Express Setup Wizard ,Cisco Device Manager, and customized Industrial Automation Smartport templates enable fast bring-up and easy configuration, while the IE SwapDrive enables quick and easy switch replacement
- High availability, predictable performance, and reliable security using Cisco IOS® Software
- Effective operation in multiple network topologies such as ring, star, and linear topologies
- Fast convergence (50ms) with Cisco Resilient Ethernet Protocol (REP)
- Support for IEEE1588v2, a precision timing protocol with nanosecond-level precision for high-performance motion applications

Cisco IE 3000 PROFINET Alarms and Diagnostics

Cisco IE 3000 Series Switches detect alarms and send diagnostic messages in real time to PROFINET controllers. With PROFINET IO support, the Cisco IE 3000 switch can notify the IO controller with an alarm for any event triggered at or beyond the switch. Diagnostics can also be accessed by the IO supervisors at a later time. In the case of a link fault or a cable break between the switch and an IO device, the Cisco IE 3000 can send the controller a “link down” notification instantly, allowing the controller to take immediate action.

Figure 1. The Cisco IE 3000 Series Switch integrated into the PROFINET network – including IO Controller, IO Supervisor and IO devices

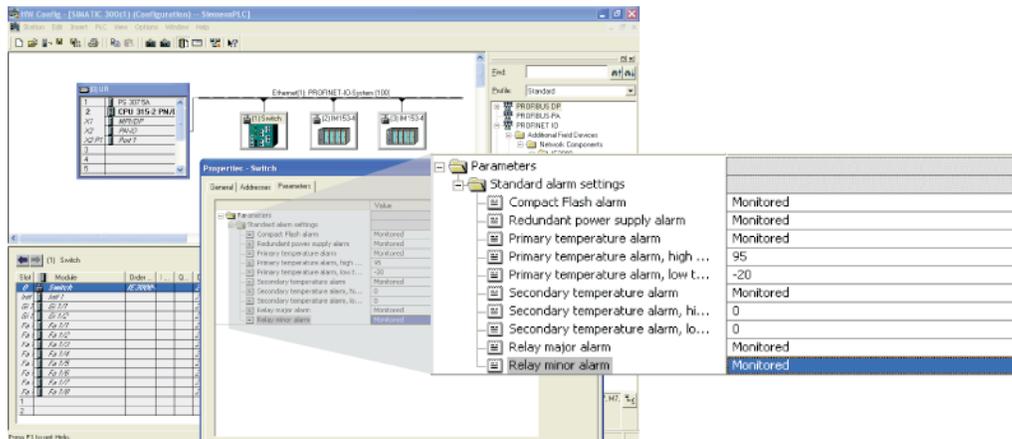


Cisco IE 3000 PROFINET Configuration and Parameterization

With PROFINET integration, the Cisco[®] IE 3000 Series Switches are commissioned quickly and easily, using the PROFINET Dynamic Configuration Protocol. The switch configuration (PROFINET device name, MAC address, IP address, and subnet mask) and switch port parameters can be set from the SIMATIC tools. Parameters for switch and switch port operation are configured and downloaded to the PROFINET controllers. The Cisco IE 3000 Series can be commissioned from scratch like any other PROFINET-capable devices by browsing the Layer 2 network.

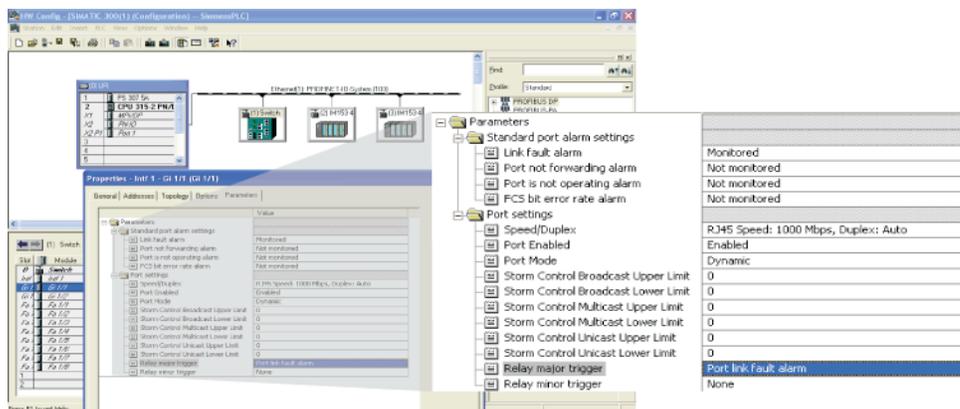
The Cisco IE 3000 can be monitored for specific event signals, such as a redundant power source failure, primary or secondary temperature alarms, alarm relays, and the removal of the compact flash. These settings are configured from the SIMATIC tools and tied to external alarm relays to trigger 24V external devices.

Figure 2. Cisco IE 3000 Series Switch configurations and diagnostics from SIMATIC tools



The Cisco IE 3000 can also be configured with port-specific parameters such as speed, duplexity, enable/disable port, and storm-control rate-limiting parameters for broadcast, unicast and multicast traffic.

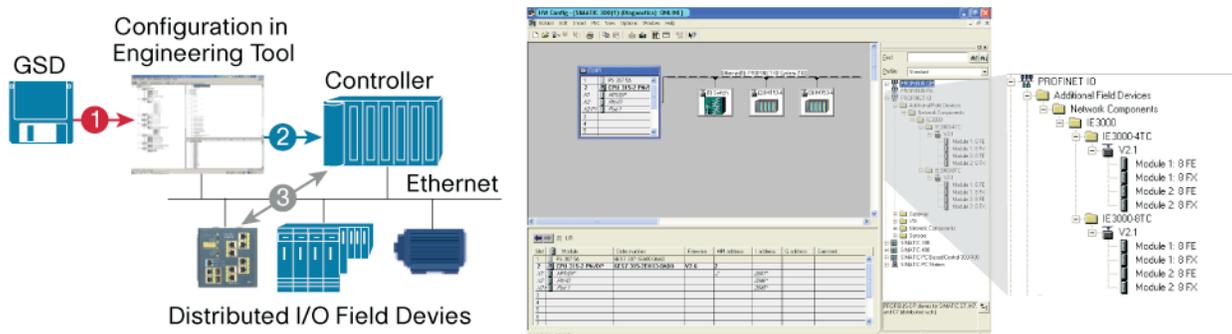
Figure 3. Cisco IE 3000 Series port configurations and diagnostics from SIMATIC tools



Cisco IE 3000 PROFINET GSD Files

GSD files for the Cisco IE 3000 enable integration with Step 7 or NCM PC management tools. These GSD files contain capabilities of the switch and expansion modules, configurable parameters, and the error codes for alarms and diagnostic messages. The GSD configuration and integration files are stored in the Cisco IE Swap Drive for quick and easy switch replacement.

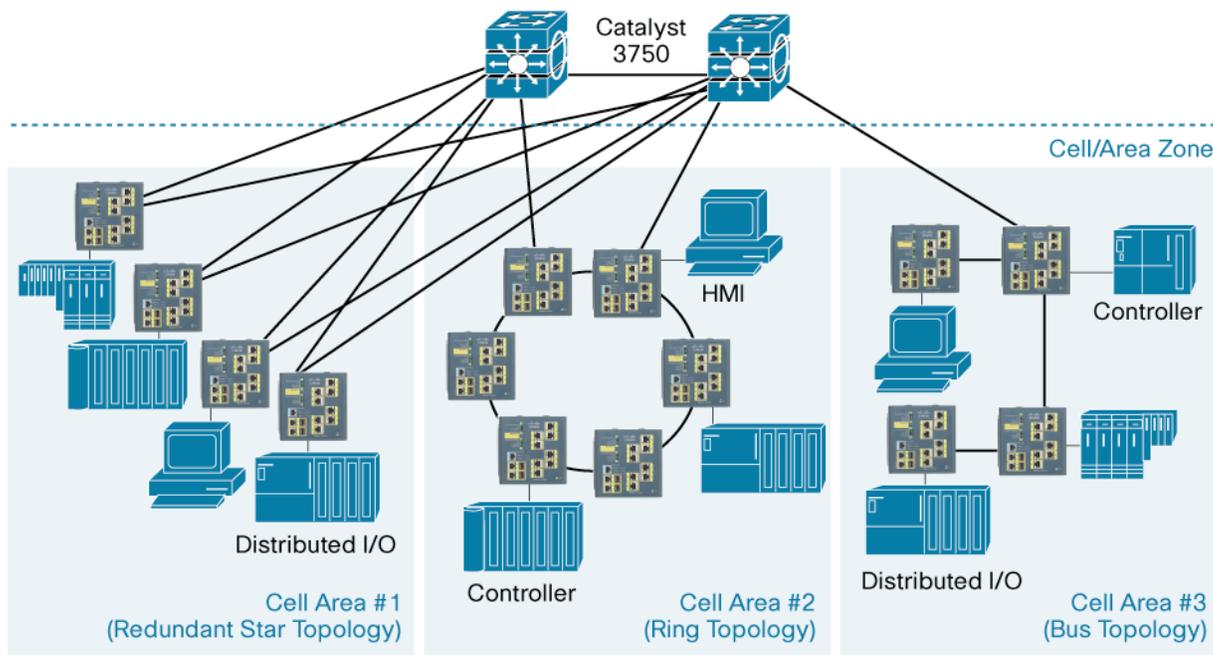
Figure 4. Cisco IE 3000 Series Switch configurations and SIMATIC tools



PROFINET Solutions and Topologies

Cisco provides a complete network architecture that enables secure integration between plant and corporate networks, and throughout the plant to the device level. The use of consistent features and the availability of management tools for both IT and manufacturing applications simplify integration, and can increase network uptime, all while reducing management and installation costs.

Figure 5. PROFINET solutions architecture



With an end-to-end, enterprise-to-plant network architecture, the Cisco Industrial Ethernet 3000 Series Switches support multiple topologies for the PROFINET industrial control network, including redundant star and ring topologies, with features such as REP and RSTP to achieve the rapid network convergence needed for industrial networks. The multiple cell zones in a plant (e.g. zones in the paint shop, body shop, assembly shop, etc.) can be aggregated using the Catalyst 3750 switches, which support high availability features such as StackWise and HSRP, or using the Cisco IE 3000 Layer 3 capable switches.

The Cisco networking solution with IE 3000 provides the security, performance, and PROFINET integration that are necessary to achieve the full benefits of an industrial Ethernet deployment. The Cisco networking solution ensures high performance for industrial automation networks, while providing secure integration with the rest of the enterprise. This leads to a more scalable, flexible industrial network and allows manufacturers to improve transparency, and information exchange into and across plant automation systems.

For more information on Cisco products and solutions:

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